

WHAT IS CLAIMED IS:

1. A mortar cartridge assembly comprising:
  - a shell body;
  - a propellant;
  - an ignition cartridge for igniting the propellant;
  - a fuze;
  - a smoke producing composition comprising an organic smoke producing agent, an oxidizer, a fuel, and a binder;
  - a metal canister for containing and protecting the smoke producing composition; and
  - a drag assembly comprising one or more ribbon streamers to slow the descent of the canister.
2. The cartridge of claim 1 wherein the organic smoke producing agent comprises an aliphatic or aromatic dicarboxylic acid.
3. The cartridge of claim 2 wherein the binder comprises an organic compound.

4. The cartridge of claim 3 wherein the binder comprises a Polyvinyl Alcohol.
5. The cartridge of claim 3 wherein the binder comprises a polymerized sucrose.
6. The cartridge of claim 1, wherein the smoke producing composition comprises a Terephthalic acid (TA) based smoke producing agent.
7. The cartridge of claim 1, wherein the smoke producing composition comprises a mixture of 53 to 57 weight percent Terephthalic acid, 3 to 6 weight percent Magnesium Carbonate, 23 weight percent Potassium Chlorate, 1 to 3 weight percent Stearic Acid, 14 weight percent Sucrose, and 1 weight percent a Polyvinyl Alcohol binder.
8. The cartridge of claim 1, wherein the smoke producing composition comprises a mixture of 53 to 57 weight percent Terephthalic acid, 3 to 6 weight percent Magnesium Carbonate, 23 weight percent Potassium Chlorate, 1 to 3 weight percent Stearic Acid, and 14 weight percent Sucrose, wherein 12 % to 100 % of the Sucrose is polymerized to become a binder.

9. The cartridge of claim 1, wherein the smoke producing composition comprises between 70 to 100 weight percent Terephthalic acid (TA) and 30 to 0 weight percent pentaerythritol (PE).
10. The cartridge of claim 9, wherein the TA and PE combined comprise 53 to 57 weight percent of the smoke producing composition, and the smoke producing composition further comprises 3 to 6 weight percent Magnesium Carbonate, 23 weight percent Potassium Chlorate, 1 to 3 weight percent Stearic Acid, 14 weight percent Sucrose, and 1 weight percent a Polyvinyl Alcohol binder.
11. The cartridge of claim 1 wherein the smoke producing composition comprises a mixture of 70 to 100 weight percent Terephthalic acid (TA) and 30 to 0 weight percent pentaerythritol (PE), wherein the TA and PE together comprise 53 to 57 weight percent of the smoke producing composition, and wherein the smoke producing composition further comprises 3 to 6 weight percent Magnesium Carbonate, 23 weight percent Potassium Chlorate, 1 to 3 weight percent Stearic Acid, and 14 weight percent Sucrose, wherein 12 % to 100 % of the Sucrose is polymerized to become a binder.
12. The cartridge of claim 1 wherein the smoke producing composition comprises a yellow smoke generating composition, which comprises a mixture of 40.2 to 43.2 weight percent Dye, Solvent Yellow 33, 20.5 to 24.5 weight percent Potassium Chlorate,

17.5 to 23.5 weight percent Magnesium Carbonate, 13.8-16.8 weight percent Sucrose, and not more than 2 weight percent a Polyvinyl Alcohol binder.

13. The cartridge of claim 1 wherein the smoke producing composition comprises a yellow smoke generating composition which comprises a mixture of 40.2 to 43.2 weight percent Dye, Solvent Yellow 33, 20.5 to 24.5 weight percent Potassium Chlorate, 17.5 to 23.5 weight percent Magnesium Carbonate, and 13.8-16.8 weight percent Sucrose, wherein 12 % to 100 % of the Sucrose is polymerized to become a binder.

14. The cartridge of claim 1 wherein the smoke producing composition comprises a green smoke generating composition which comprises a mixture of 12 to 13 weight percent Dye, Solvent Yellow 33, 28.5 to 30.5 weight percent Dye, Solvent Green 3, 23 to 26 weight percent Potassium Chlorate, 15 to 19 weight percent Magnesium Carbonate, 15.5-17.5 weight percent Sucrose, and not more than 2 weight percent a Polyvinyl Alcohol binder.

15. The cartridge of claim 1 wherein the smoke producing composition comprises a green smoke generating composition which comprises a mixture of 12 to 13 weight percent Dye, Solvent Yellow 33, 28.5 to 30.5 weight percent Dye, Solvent Green 3, 23 to 26 weight percent Potassium Chlorate, 15 to 19 weight percent Magnesium Carbonate, and 15.5-17.5 weight percent Sucrose, wherein 12 % to 100 % of the Sucrose is polymerized to become a binder.

16. The cartridge of claim 1, wherein the cartridge size is 120mm.
17. The cartridge of claim 1, wherein the smoke producing composition is formed into at least one consolidated element dimensioned to fit within the metal canister and comprising a longitudinal channel adapted to allow for expansion of the smoke producing composition during firing and to improve ignition reliability.
18. The cartridge of claim 17 wherein the at least one consolidated element is in the shape of an annulus.
19. A canister for containing and protecting a smoke producing composition within a smoke producing cartridge, comprising:
- a right circular steel cylinder comprising a top and a bottom, dimensioned to be secured within the shell body of a 120mm mortar cartridge;
  - a steel reinforcing plate affixed to the bottom of the cylinder; and
  - an attachment stud affixed to a bottom surface of the steel reinforcing plate for attaching a drag force assembly.
20. The canister of claim 19, wherein the cylinder comprises an outer diameter of about 93.35 mm, a height of about 133 mm and a side wall thickness of about 1.90 mm.

21. A smoke producing mortar cartridge, comprising:
- a two part shell body comprising a payload compartment;
  - a tailfin assembly positioned below the two part shell body;
  - at least one external propellant charge positioned above the tailfin assembly;
  - an ignition cartridge for igniting the least one external propellant charge;
  - a fuze;
  - a black powder charge positioned below the fuze;
  - a first aluminum plate positioned below the black powder charge having an outer diameter dimensioned to fit within the shell body and including a center hole;
  - a second aluminum plate positioned between the first aluminum plate and the black powder charge, having substantially the same outer diameter as the first aluminum plate and including a center hole that is coaxial with the center hole of the first aluminum plate but smaller in diameter;
  - a non-metallic spacer positioned above the second aluminum plate having an outer diameter substantially identical to the second aluminum plate and an axial hole of a diameter greater than the center hole of the second aluminum plate;
  - a starter patch positioned below the second aluminum plate;

a smoke producing composition positioned below the starter patch and in contact therewith, wherein the smoke producing composition comprises an organic smoke producing agent, an oxidizer, a fuel, and an organic binder;

a steel reinforced canister for containing and protecting the smoke producing composition and dimensioned to be releasably secured within the payload compartment; and

a drag assembly attached to the canister and positioned below the canister in the payload compartment, comprising one or more ribbon streamers adapted to slow the descent of the canister and reduce drifting.

22. The smoke producing mortar cartridge of claim 21, wherein the smoke producing composition is consolidated into a plurality of preformed elements dimensioned for stacking within the canister.

23. The smoke producing mortar cartridge of claim 22, wherein the elements are substantially annular in shape.

24. The smoke producing mortar cartridge of claim 23, wherein the substantially annular elements comprise concentric holes that form a vertical channel in the smoke producing composition to improve ignition and smoke producing capabilities.

25. A drag assembly for a canister of a mortar cartridge, comprising at least one streamer adapted to slow the descent of the canister.
26. The drag assembly of claim 25 wherein the drag assembly is adapted to generate a drag force for slowing down the canister from approximately 82 meters/sec to about 27 meters/sec.
27. The drag assembly of claim 26 wherein the streamer is comprised of a plurality of nylon ribbons.
28. The drag assembly of claim 27 wherein the streamer further comprises at least one grommet.
29. The drag assembly of claim 27 wherein the streamer further comprises a spring pin for attachment to the canister.
30. A method for producing a smoke obscuration mortar cartridge, comprising:  
providing a smoke producing composition that includes an organic smoke producing agent, an oxidizer, a fuel, and a binder;  
forming the smoke producing composition into one or more annular elements;



providing a metal canister dimensioned to fit the payload compartment of a mortar cartridge and adapted to protect the annular elements from cracking under the forces expected after a launch of the mortar cartridge;

loading the annular elements into the metal canister; and

providing a drag assembly for the canister adapted to slow the descent of the canister without substantial drift;

wherein adverse environmental impact and collateral damage from the smoke obscuration are reduced and targeting accuracy is improved.

31. The method of claim 30 wherein the organic smoke producing agent comprises an aliphatic or aromatic dicarboxylic acid.

32. The method of claim 30 wherein the binder comprises a Polyvinyl Alcohol.

33. The method of claim 30 wherein the binder comprises a polymerized sucrose.

34. The method of claim 30, wherein the smoke producing composition comprises a Terephthalic acid based smoke producing agent.

35. The method of claim 30, wherein the smoke producing composition comprises a mixture of 53 to 57 weight percent Terephthalic acid, 3 to 6 weight percent Magnesium

Carbonate, 23 weight percent Potassium Chlorate, 1 to 3 weight percent Stearic Acid, 14 weight percent Sucrose, and 1 weight percent a Polyvinyl Alcohol binder.